APPLICATION

FOR

UNITED STATES LETTERS PATENT

FOR

PULSE RATE, PRESSURE AND HEART CONDITION MONITORING GLASSES

BY

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PULSE RATE, PRESSURE AND HEART CONDITION
MONITORING GLASSES

BACKGROUND OF THE INVENTION

This application claims the benefit of U.S. Provisional Application No. 60/101,138, filed September 18, 1998.

Adverse heart conditions may lead to fatalities and long-term ill effects. Generally, the warning signs of an adverse heart condition are not realized in time to take preventive measures to lessen the long-term ill effects. The severity of the resulting problems due to an adverse heart condition may be lessened by an early determination of the onset of such a condition. A need exists for a heart condition monitor that detects adverse heart conditions early so that measures may be taken to lessen the long term ill effects resulting from the adverse heart condition.

SUMMARY OF THE INVENTION

Battery and solar cell powered health glasses monitor the condition of a heart's vital signs. Light emitting diodes (LED's) emit light into human temples. Photodiodes capture light reflected back from the pulsing blood. Blood vessels expand when the heart beats. The amount of reflected light corresponds to the pulse rate. Embedded circuitry cleans and amplifies the signals, which are transmitted to light emitters located in the glasses. The same signals may be transmitted to a remote receiver to be processed and/or stored. Rhythm and shape of the pulse rate, processed on a home computer and available to doctors

via the Internet, indicates heart condition. The circuits provide signal triangulation verification and warning lights.

The sensors may be located any place on the body, i.e. wrist bands, chest, head, etc. A transmitter sends signals to the circuitry on the glasses to display reading information and lights about heart condition, pulse rate and blood pressure. Circuits on the glasses process and display electrical signals, pressure signals, pulse rate signals and combinations thereof.

These and further and other objects and features of the invention are apparent in the disclosure, which includes the above and ongoing written specification, with the claims and the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a schematic representation of glasses with sensors and displays.

Figure 2 is a schematic representation of the processing of signals.

Figure 3 is a schematic representation of glasses with displays and remote sensors.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to Figure 1, a pair of sensing and indicating glasses is generally indicated by the numeral 1. The glasses have frames 3 with frontal lens holder portions 5 and temple pieces 7. A bridge 9 above the lenses 11 contains electronic

circuitry 13, solar cells 15, a battery 17, and a radio transmitter 19. Light emitting diodes (LED's) 21 are arranged in an array 23 along the insides of the temples. Photosensors 25 are arranged in an array 27 along the diodes and near the LED's 21, but not in direct light contact with the LED's 21. The LED's 21 produce light that is directed into the skin of the human temples near the area of the external carotid arteries. Light from the LED's is reflected to the photodiodes 25, either by being reflected by the skin or by being reflected after entering the arteries. The amount of light from the LED's returning to the photodiodes is periodically changed with each pulse. The change is sensed with the photodiodes that are connected to the circuitry 13, and the light from the pulse of the expanded artery is compared with the light from the relaxed arteries. The periodic rate is used by the circuitry 13 as a measure of pulse rate. The total light as compared to baseline, such as the lowest total light over a long period when the glasses are worn during a period of rest, provides a signal which is related to pulse rate or blood pressure.

Target quantities such as pulse rate may be input by conventional buttons that are mounted internally or externally on the frames 3. Alternatively, the radio transmitter 19 may be a transceiver, and target rates may be input by radio.

The glasses shown in Figure 1 may have a complex or simplified form of heads-up displays that show numbers, such as by seven-segment displays or selective dot matrix illumination.

Alternatively, the glasses have series of lamps 31 arranged in vertical arrays 33 and horizontal arrays 35 along the edges of the lens mounts. The lamps 31 may be illuminated individually and in groups to indicate pulse rate or blood pressure. The lamps may be of varied colors and may be focused to illuminate the glass in straight lines across the glass, or may be defocused to wash the glass with light. The light may be of uniform or select color. For example, a small green light in the corner may mean that the system is on, a yellow light diagonally across the corner may indicate that a target rate is being approached, and a white light 37 lower down and farther from the upper corner may indicate that a target rate has been reached. Lights causing a diagonal red line further down along the lens may indicate that a target has been exceeded, and purple illuminations diagonally across the centers of the lens may indicate that a target rate has been far exceeded, perhaps dangerously.

The radio transmitter 19 transmits to a receiver 41, which may be connected to a home computer 43, which in turn may be connected to the web 45 and thereby to a doctor's office 47. The computer 43 may connect to the web 45 upon exceeding of predetermined conditions, either above or below limits, so that an Internet connection may be used to alert a doctor's office 47. Alternatively, the Internet connection 45 may be used to alert an emergency service or an emergency number, such as 911. Under severe conditions, it is preferable to dial an emergency service or 911 before alerting a doctor's office.

Because exercise and muscle movements may be read as pulses, the invention uses signal triangulation verification.

Figure 2 shows a signal discriminator chip 51 which is connected to the glasses 1 and to a watch 53 for receiving a pulse rate, and which is connected to electrodes 55 stuck on a chest or other positions on a body to determine heart rate. As an example, the electrodes 55 may sense breathing rate. The signal discriminator 51 is mounted on or connected to display glasses 1, either by radios or wires, to receive pulse rate and pressure signals from the glasses, the watch and the electrodes, and to provide signals for controlling displays.

As shown in Figure 3, glasses 61 mount a radio receiver 63, which receives signals from a radio sender 65 mounted on a wrist watch band 67. A pulse sensor button 68 mounted on the inside of a watch strap buckle 69 is connected to the radio sender 65 to send pulse rate signals to the local radio receiver 63 mounted on the glasses 61. A matrix-type heads-up display of the type used in aviator or astronaut helmets displays numbers and directions. The lenses 71 may include several seven-segment or multiple element matrixes which are selectively energized and illuminated.

While the invention has been described with reference to specific embodiments, modifications and variations of the invention may be constructed without departing from the scope of the invention, which is defined in the following claims.